Care and Feeding of a Staff for Filmless Radiology

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Texas Children's Hospital, a definitive care pediatric hospital located in the Texas Medical Center, has been constructing a large-scale picture archival and communications system (PACS) including ultrasound (US), computed tomography (CT), magnetic resonance (MR), and computed radiography (CR). Developing staffing adequate to meet the demands of filmless radiology operations has been a continuous challenge. Overall guidance for the PACS effort is provided by a hospital-level PACS Committee, a department-level PACS Steering Committee, and an Operations Committee. Operational Subcommittees have been formed to address service-specific implementations, such as the Emergency Center Operations Subcommittee. These committees include membership by those affected by the change, as well as those effecting the change. Initially, personnel resources for PACS were provided through additional duties of existing imaging service personnel. As the PACS effort became more complex, full-time positions were created, including a PACS Coordinator, a PACS Analyst, and a Digital Imaging Assistant. Each position requires a job description, qualifications, and personnel development plans that are difficult to anticipate in an evolving PACS implementation. These positions have been augmented by temporary full-time assignments, position reclassifications, and cross-training of other imaging personnel. Imaging personnel are assisted by other hospital personnel from Biomedical Engineering and Information Services. Ultimately, the PACS staff grows to include all those who must operate the PACS equipment in the normal course of their duties. The effectiveness of the PACS staff is limited by their level of their expertise. This report discusses our methods to obtain training from outside our institution and to develop, conduct, and document standardized in-house training. We describe some of the products of this work, including policies and procedures, clinical competency criteria, PACS inservice topics, and an informal PACS newsletter. As the PACS system software and hardware changes, and as our implementation grows, these products must to be revised and training must be repeated.

TEXAS CHILDREN'S HOSPITAL, A definitive-care pediatric hospital located in the Texas Medical Center, has been constructing a large-scale picture archival and communications system (PACS) including ultrasound (US), computed tomography (CT), and magnetic resonance (MR) since 1991. Computed radiography (CR) has been operational since October 1995 in the Outpatient Treatment Center. The PACS network was expanded to include the Main Radiology Department in August 1997. We began to perform all Emergency Center examinations by CR in December 1997, providing referring physicians softcopy images only. Developing staffing adequate to meet the demands of filmless radiology operations has been a continuous challenge. These challenges included training personnel, writing policies and procedures, and tracking down problems encountered by the staff, and adequately staffing the PACS service.

MANAGEMENT STRUCTURE

Overall guidance for the PACS effort is provided by a hospital-level PACS Committee, a department-level PACS Steering Committee, and an Operations Committee. Operational Subcommittees have been formed to address service-specific implementations, such as the Emergency Center Operations Subcommittee (Fig 1). These committees include membership by those affected by the change, as well as those effecting the change. The Diagnostic Imaging Quality Improvement Committee took an active role in monitoring work flow studies before and after the implementation of PACS.

Initially, personnel resources for PACS were provided through additional duties of existing imaging service personnel. Developing a PACS service was a major undertaking. As the PACS environment became more complex, full-time positions were created, including a PACS Coordinator, a PACS Analyst, and a Digital Imaging Assistant. The PACS Coordinator position was developed to apply technical expertise in areas of systems management, system programming, planning, and problem resolution. This position was intended to manage computer systems in context of normal system maintenance, systems upgrades and installing/implementing software. A PACS Analyst position was created to handle the configuration of all modalities that interface with the network. This position was to provide for continuity of clinical

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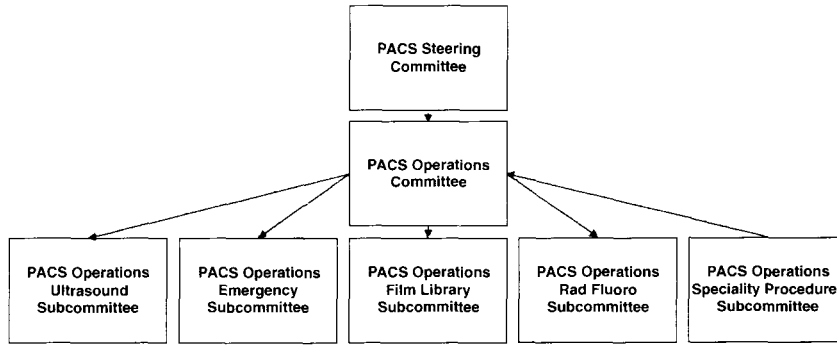

Fig 1. Structure of PACS Committee.

operations of the PACS network, manage and document the physical and software configurations of PACS equipment, and serve as a System Administrator for PACS. The Digital Imaging Assistant position was added to update computer records to include image management, maintaining database integrity and the retrieval of digitized archived images.

Each position required a job description, qualifications, and personnel development plans that are difficult to anticipate in an evolving PACS implementation. These positions have been augmented by temporary full-time assignments, position reclassifications, and cross-training of other imaging personnel. An additional two full-time PACS Analyst positions were added as we moved towards a completely filmless environment. Even though the title "PACS Analyst" was used, each employee has unique overall job duties. The first PACS Analyst remains as the PACS System Administrator, who is the only person with the benefit of formal training from the vendor. The second PACS Analyst has a computer background and oversees all configuration and training for personal computer–based image viewing within the hospital. This person also has been trained on-the-job to substitute for the System Administrator when needed. The third PACS Analyst position is a licensed Radiological Technologist. This person primarily exercises oversight of CR, but also assists in operations. This person also performs quality control on the equipment are met, as well as inservicing all radiologic technologists and ancillary personnel to operate each individual piece of equipment necessary to acquire and archival of CR images. Quality control of equipment is necessary to assure all state regulations are met, as well as to assure overall consistency in diagnostic image quality. Imaging personnel are assisted by other hospital personnel from Biomedical Engineering and Information Services.

TRAINING

As the department became more committed further into filmless radiology, training personnel to operate the equipment was identified as a problem area. Ultimately, the PACS staff grows to include all those who must operate the PACS equipment in the normal course of their duties. Adequate training of technologist, support personnel, physicians and clinicians that must use the system is a major undertaking. Policies and procedures (Table 1) should first be written on each separate component of the PACS network. Clinical competency criteria checklists (Table 2) should be developed that are appropriate to each job classification and level of training of staff that rely on that component to perform their individual duties. Documentation of training and competency must be initiated to satisfy Joint Commission Accreditation Hospital Organization requirements, but also to assure that new or temporary employees are adequately trained and

Table 1. Clinical Competency Criterion Checklist

	CR Cassettes Maintenance/Cleaning	
Competency Title	s	u
CRITICAL ELEMENTS		
1. Demonstrates proper procedure for opening cassettes.		
2. Correctly removes phosphor plate, orienting white side up.		
3. Demonstrates proper safety precautions when applying cleaner.		
4. Demonstrates ability to properly clean phosphor plate.		
a. Places plate on firm surface before wiping with cleaner.		

Table 2. Diagnostic Imaging: PACS Department Policies and Procedures Table of Contents

Policy and Procedure	No.
Digitizer/transmit station	20.01
CR cassette maintenance	20.02
ID station	20.03
ADC70 digitizer	20.04
Processing station	20.05

competent. The overall clinical operation must be analyzed to configure the system properly to support individual user needs.

RETRAINING

The initial training of staff to utilize the PACS system was found to be inadequate for routine clinical operations. Vendor support in this area was limited. More in-depth training was necessary for many job classifications such as Supervisors/Lead Technologists. Refresher courses were also necessary to assure there was a complete understanding of each component in the PACS network. A monthly newsletter was initiated to educate the radiology staff on terminology, icons, and a general overview of the PACS network.

CONCLUSION

The effectiveness of the PACS staff is limited by their level of their expertise. As the PACS system software and hardware changes, and as our implementation grows, these products must to be revised and training must be repeated. Each upgrade of equipment and software revisions require training updates to be conducted to appropriate personnel. As PACS branches out into the bedside environment, each floor/unit will need a system to view the images in their perspective areas. All of the clinicians, physician assistants, nurses, and other pertinent personnel will need training to use the equipment with different user rights according to their job expertise. As with any large facility, as personnel changes, training must be given to all new employees, as well as refresher courses. Despite conscientious planning and implementation of a filmless radiology system, training of staff is a major component in the care and feeding of a staff for filmless radiology. The PACS staff must be given formal and on-the-job training, which they in turn, must provide for the diagnostic imaging service and the hospital.

REFERENCES

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